



## Dr Catherine Hughes

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Dr Catherine Hughes is currently a lecturer in Public Health Nutrition and the assistant research group leader for the Nutrition Innovation Centre for Food and Health (NICHE) at Ulster University. Dr Hughes's research is focused on nutrition and healthy ageing with a particular interest in brain health. She has extensive experience of research study design and conducting highly controlled nutrition studies in different population and clinical groups.

Dr Hughes is the coordinator of the Trinity-Ulster-Department-of-Agriculture (TUDA) study which is designed to investigate nutritional factors in ageing and is one of the largest and most comprehensively characterised cohorts for ageing research internationally. She is also involved in a multidisciplinary project using artificial intelligence and geographical information systems to investigate mental health inequalities in Ireland.

Dr Hughes is interested in the interaction between B-vitamins, a common polymorphism in the folate metabolising enzyme methylenetetrahydrofolate reductase (MTHFR) and blood pressure. She is the postgraduate tutor within NICHE and has also supervised a number of PhDs to successful completion. She has published in the area on B-vitamins and one carbon metabolism and nutrition in healthy ageing and has attracted considerable external grant income. She is also actively involved in teaching and administration of BSc and MSc programmes in Food, Nutrition and Dietetics at Ulster University and is Course Director for the BSc in Human Nutrition.



# B-vitamins: mental health and the ageing brain

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Globally, the population is ageing rapidly. Dementia and other mental health disorders are a leading cause of disability and ill health in older age. Dementia affects an estimated 55 million people worldwide and these figures are expected to triple by 2050. Depression is among the most common mental health problems, affecting an estimated 10% of the Irish population. Given the significant societal and economic impacts associated with these disorders, there is an urgent need to identify modifiable risk factors to inform intervention strategies to promote better mental health in ageing. The Dementia prevention, intervention, and care: 2020 report of the Lancet Commission identified 12 modifiable risk factors across the life course that could be targeted to reduce the risk of dementia. Nutrition is also increasingly recognised as an important determinant of mental health throughout life.

In adulthood, certain dietary patterns, including the Mediterranean and MIND Diet have been associated with a lower risk of dementia and depression. Specific nutrients, including omega-3 fatty acids, polyphenols and B-vitamins have also been associated with better mental health outcomes. Indeed, accumulating evidence from randomised controlled trials supports such a causative role for these B-vitamins, the most convincing of which is the VITACOG study where combined B-vitamin supplementation over two years reduced cognitive decline and reduced the rate of brain atrophy. The Trinity-Ulster-Department-of-Agriculture (TUDA) study, a North-South of Ireland observational study of

5186 community dwelling older adults (2008-2012), who were recruited as part of a collaborative project between our centre and Trinity College Dublin provides an excellent platform to study the role of nutrition in ageing. Results from the TUDA study indicates that B-vitamins are important for preserving mental health in ageing. Low status of folate, vitamin B6 and riboflavin, were each associated with an increased risk of depression whilst regular consumption of foods fortified with these B-vitamins reduced the risk of depression by as much as 56%. Other results demonstrate that low vitamin B6 status was associated with a greater rate of cognitive decline over a 5-7 year follow-up period.

Moreover, the BrainHop trial, demonstrated that combined B-vitamin supplementation (providing daily 400µg folic acid; 10µg B12; 10mg B6; 10mg riboflavin) for 2 years compared to placebo had beneficial effects on the visuospatial cognitive domain. Evidence from the TUDA studies demonstrates that folate and related B-vitamins play an important role in protecting brain health in older people. Optimising B-vitamin status in older populations may have important impacts on mental and neuropsychiatric health and in turn would help to preserve better quality of life in ageing.

